TA-73

Department of Energy

National Nuclear Security Administration
Los Alamos Site Office
Los Alamos, New Mexico 87544

JUN 1 3 2003

JUN 2003

State of New Mexico
Environment Department
Hazardous Waste Bureau
Attn: Mr. James Bearzi
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303

Dear Mr. Bearzi:

Subject: Interim Measures Plan for Potential Release Site 73-001(a)

As enclosures to this transmittal letter, the Department of Energy National Nuclear Security Administration (DOE/NNSA) is submitting two copies of the subject Interim Measures Plan for your review and approval. This plan was written in accordance with NMED, Hazardous Waste Bureau guidance provided in an April 24, 2003 correspondence on the same subject.

For purposes of performing this particular Interim Measures Plan, NNSA/DOE elected to employ contractor support from Department of Defense instead of using the University of California Los Alamos National Laboratory (LANL). LANL is providing only partial support to NNSA/DOE in this case. DOE has overall responsibility for implementing the enclosed plan, including any failure(s) to execute. DOE intends to execute this plan as soon as possible according to the schedule provided.

If there are any questions regarding this plan or addendum, I can be reached at (505) 667-5808.

Sincerely,

David R. Gregory

David R. Gregory
Project Manager

Enclosure

cc:
See Page 2

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JUN 1 3 2003

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June 2003

Department of Energy

Interim Measure Plan For Potential Release Site 73-001(a) Debris Removal

Los Alamos, NM 87544

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1.0 INTRODUCTION

The Airport Landfill received municipal waste from the laboratory and Los Alamos town site from 1943 until 1973. Debris associated with this landfill spilled into at least four drainages leading from the mesa top area down to the bottom of Pueblo Canyon. Debris found in these drainages along the side slopes of the south side of Pueblo Canyon is composed of tires, car bodies, pieces of concrete and asphalt, empty drums, galvanized steel trash cans, and other miscellaneous debris items. The mesa top area is leased to LAC from the US Department of Energy (DOE). The LAC operates the county municipal airport located between Los Alamos and Pueblo Canyons. The drainage areas are on Los Alamos County (LAC) property. Removal and disposal of the surface debris followed by confirmatory sampling and analysis will be completed as an interim measure (IM) to comply with New Mexico Surface Water Regulations prohibiting debris in a water course (NMWQCC 1995, 54406.1). This IM also provides for site restoration and control of stormwater runoff. Pueblo Canyon is undeveloped except for County utility operations and is used moderately for recreational purposes. An ancillary function of the IM is facilitation of transfer of mesa top airport property from DOE to Los Alamos county ownership.

1.1 Background

The primary impetus on this project is compliance with both state and federal surface water regulations. A team comprised of DOE, UC, and NMED members drafted an IM Plan that specified that the debris removal phase of this project would be accomplished by use of manual labor and helicopter for lifting debris to the mesa top staging area. In the final review of the IM Plan selected by the integrated project team, management at both DOE as well as LANL suggested a re-evaluation of removal methods to determine if other cost effective technologies were available that would provide a greater margin of safety. Although use of helicopter for lifting material from steep side slopes is routine for certain situations, there is concern on DOE's part that the value added to the public and the environment do not warrant the risks associated with using a helicopter to remove legacy debris from ephemeral arroyos.

At a meeting held in the NMED, Hazardous Waste Bureau Office on April 15, 2002, DOE informed HWB and SWQB team members of DOE's decision to pursue a removal method that could offer a greater margin of safety. Around the May 2002 time frame, RRES-R (formerly LANL-ER) began working to develop a cost estimate for an alternative method.

1.2 Purpose and Scope

The purpose of this IM is to remove surface debris from drainage ravines downgradient of the PRS 73-001(a) landfill. To achieve this purpose, this plan proposes actions that include further exploration for debris downgradient of the landfill; removal of surface debris in drainage ravines and in areas between drainage ravines; removal of contaminated soil, as necessary; collection of confirmatory samples following debris and soil removal; site restoration; and collection of supplemental samples, as required. A scope of proposed activities is presented below.

- Review existing data and collect supplemental samples, as necessary, to define the extent of soil/sediment contamination associated with the PRS 73-001(a) drainages. A preliminary review of the data has been completed and it has been determined that supplemental sampling is not warranted prior to debris removal.
- Identification of clean-up criteria
- Removal of debris from four drainages

- Waste segregation and disposal
- Confirmatory sampling and analysis
- Site restoration and erosions control
- Completion of the IM Completion Report

Debris removal within the main landfill, including the east end where debris is weathering out of the slope, is not currently included within the scope of this project. These areas will be remediated, as required, as part of a voluntary corrective measure (VCM) of the landfill.

Results of the IM will be detailed in an IM report to be prepared following completion of all field activities and receipt of all analytical data.

1.3 Rationale for Proposed Interim Measure

The Los Alamos National Laboratory (the Laboratory) Environmental Restoration (ER) Project conducted a Resource Conservation and Recovery Act (RCRA) facility investigation (RFI) (LANL 1998, 63070.1) at the former Los Alamos County Landfill [potential release site (PRS) 73-001(a)] starting in April 1994 and continuing on and off through September 1997. Site characterization sample data from this RFI indicated potential contamination in the Pueblo Canyon drainages downgradient of the landfill. This contamination, in addition to abundant surface debris in at least four of the drainages, is a result of past landfill operations. Removal of the surface debris followed by confirmatory and supplemental sampling, as required, will be completed as an interim measure (IM) to alleviate concerns about debris in a water course (NMED 1995, 54406.1) and the possibility of residual contamination that may remain at concentrations representing potential unacceptable risks to human or ecological receptors. In addition, these activities will help achieve the transfer of mesa-top airport property from US Department of Energy (DOE) to Los Alamos County ownership.

The chemicals of potential concern (COPCs) were identified for the drainages during the RFI. The locations containing the majority of the known debris have been identified as a result of several site visits. The remedial option is described in Section 3.0 of this document. The time that it will take for actual debris removal has been estimated to be approximately 6 months. The current and future land-use assumption of continued use as an airport is straightforward and does not impact this IM or the subsequent site restoration.

2.0 PREVIOUS SITE CHARACTERIZATION

2.1 Site Description

PRS 73-001(a) is an inactive municipal landfill in Technical Area 73 (TA-73) that is designated as a PRS and listed in Module VIII, Table A, of the Laboratory's Hazardous Waste Facility Permit (LANL 1990, 1585; 1994, 44146. This inactive landfill is located on DOE property at the Los Alamos County Airport, north of the asphalt taxiway to the hot pad and east of the asphalt aircraft tie down area (Figures 2.1-1 and 2.1-2). Several drainage pathways lead from the edge of the mesa adjacent to the landfill, down the side of Pueblo Canyon. The scope of this IM is limited to the drainages and other debris found on the Pueblo Canyon walls during the implementation of the IM.

The landfill consisted of a natural hanging valley that received municipal waste from the Laboratory and Los Alamos townsite for disposal. The north side of the landfill extended to and paralleled the edge of the mesa. To the east, the landfill extended to the end of the hanging valley and pinched out further east toward the hot pad (Figure 2.1-2). No documented historical releases are known to have occurred outside the landfill boundary. However, tires, car bodies, pieces of concrete and asphalt, empty drums, galvanized steel trash cans, and other miscellaneous debris are present in at least four drainage channels along the south slope of Pueblo Canyon adjacent to the landfill area. The largest volume of debris appears to be at the east end of the landfill in the drainage channel originating below the hanging valley (Figure 2.1-2, drainage D2). The D1 to D4 drainage channel designations were first used in the landfill RFI report (LANL 1998, 63070.1), and are used in this IM plan. An additional channel ("drainage C") originating approximately 600 ft west of drainage D2 and approximately 300 ft east of drainage D3 contains somewhat less debris. The remaining two drainage channels containing relatively large concentrations of debris are both located east of drainage D1. The first ("drainage B") originates approximately 100 ft east and appears to join drainage D1 approximately 400 ft downslope. The second ("drainage A") originates approximately 450 ft east of drainage D1. Drainages D1, D3, and D4 contain no accumulations of debris.

Operational History

In 1943, the DOE began operating the landfill. Garbage was collected twice a week from the Laboratory and townsite and burned on the edge of the hanging valley located north of the airport runway (Miller 1963, 00684). This intentional burning ceased in 1965, when Los Alamos County assumed operation of the landfill (Miller and Shaykin 1966, 36692). Heavy equipment was used to push the burned residues and ash into the landfill. The county continued to operate the landfill until June 30, 1973 (Drennon 1991, 00650). The landfill was subsequently closed. Debris in the drainages appears to have accumulated there incidentally as a result of landfill operations.

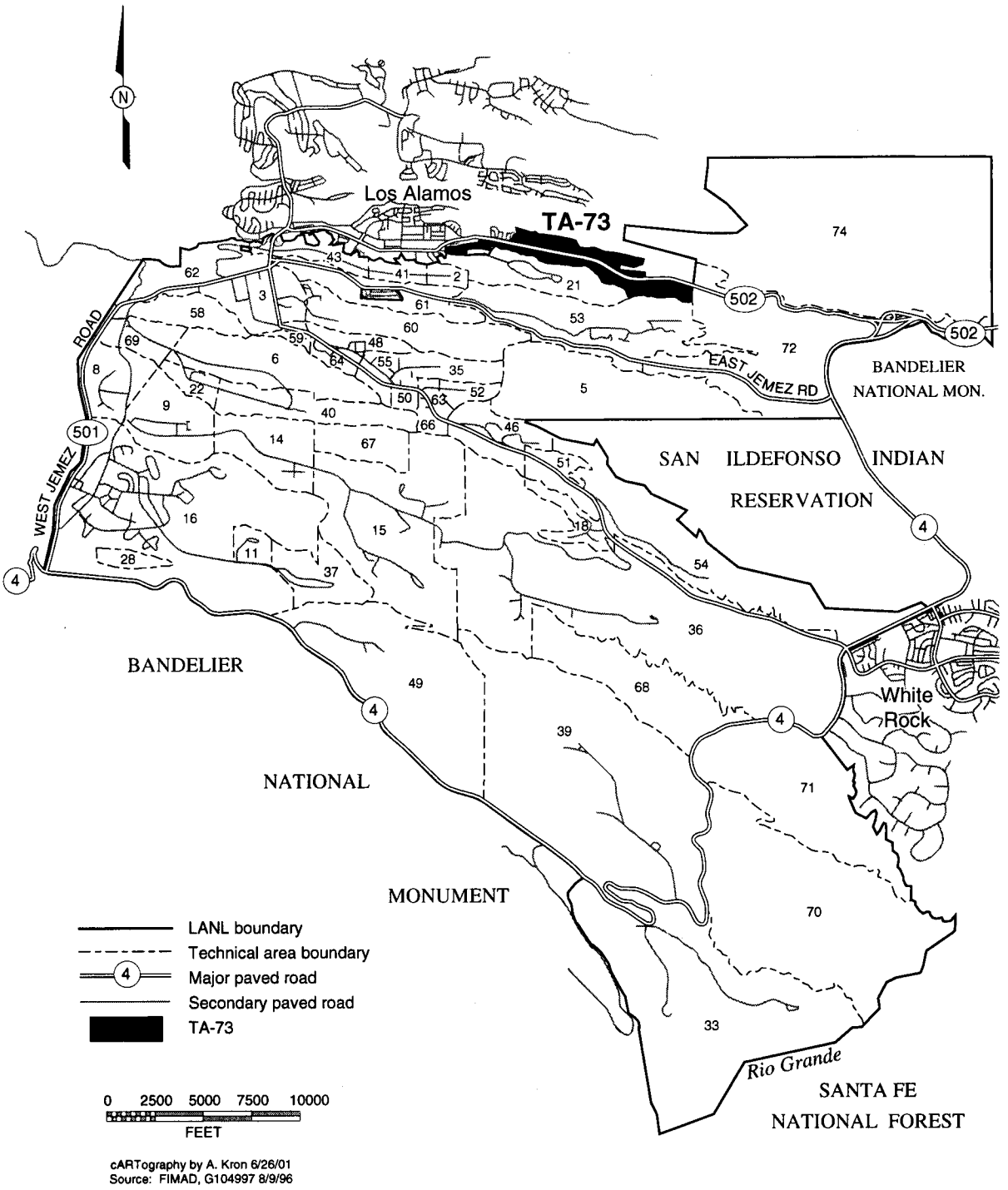

Figure 2.1-1. Location of TA-73 with respect to Laboratory TAs and surrounding landholdings

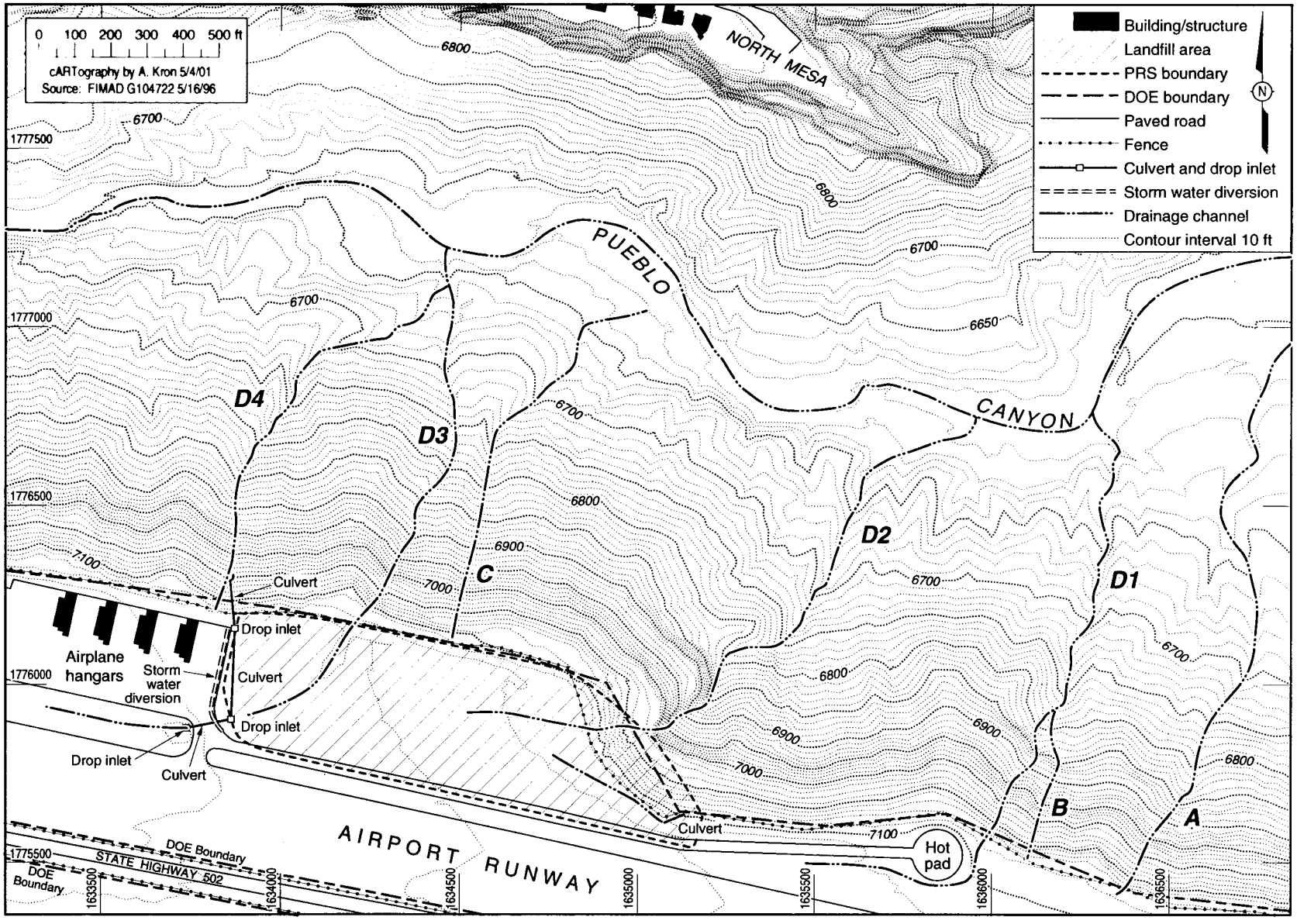

Figure 2.1-2. PRS 73-001(a) with primary drainage channels that originate on, or transect, the landfill surface

2.2 RFI Information and Other Decision Data

2.2.1 Previous RFI Investigations

Phase I RFI activities at the airport landfill began in April 1994 and continued intermittently through September 1997. The investigation was conducted in several phases that included three primary tasks: Task 1, Field Surveys; Task 2, Surface Sampling; and Task 3, Subsurface Sampling. As part of these tasks, several activities were completed, with geomorphic mapping and channel sediment sampling being the most relevant to the IM. During the geomorphic mapping, four primary drainages were identified that originated at or transected the surface of the landfill and extended to the canyon floor (Figure 2.1-2, drainages D1-D4). Three sediment accumulation areas were identified in each of these four drainages from which channel sediment samples were collected. Two sediment samples also were collected from a secondary drainage immediately west of drainage D2. A total of 15 sediment samples, including one quality assurance/quality control (QA/QC) duplicate, were collected from 13 locations. Table 2.2-1 summarizes the sample identification (ID) numbers, requested analytes and associated request numbers. The sample locations are depicted on Figure 2.2-1.

During preparation of the landfill RFI report, analytical data for the sediment samples were validated and reviewed to identify COPCs (LANL 1998, 63070.1). Table 2.2-2 lists the inorganic, radionuclide, and organic COPCs that were identified for sediment in the RFI report and gives the maximum detected concentration, the location, and depth for each. Figures 2.2-2, 2.2-3, and 2.2-4 show the locations where the COPCs were detected.

2.2.2 Screening Assessments

The sediment sample data are evaluated in the following sections (Section 2.2.2.1, Human Health, and Section 2.2.2.2, Ecological) to summarize the potential risk posed by the COPCs in the drainage channel sediment.

2.2.2.1 Human Health

The maximum concentrations of COPCs detected above background are presented in Table 2.2-3 (noncarcinogens), Table 2.2-4 (carcinogens), and Table 2.2-5 (radionuclides) and compared to their respective screening action levels (SALs). The SALs used in these comparisons are based on residential scenarios and are presented in the technical background document of soil screening levels (NMED 2000, 68554), the US Department of Energy's human health medium-specific screening levels (EPA 2000, 68410), and "Derivation and use of Radionuclide Screening Action Levels" (LANL 2001, 69683). The maximum concentrations by location for each COPC are shown on Figures 2.2-2, 2.2-3, and 2.2-4.

No noncarcinogens were detected above their SALs. The hazard quotients (HQs) (ratios of maximum concentrations to SALs) for each chemical were summed. The hazard index (HI) (total of HQs) was less than one, indicating that no potential for increased human health hazard is expected from these chemicals at their maximum on-site concentrations.

Table 2.2-1
PRS 73-001(a) Channel Sediment Sample Summary

				Analyses Requested			
Location ID	Sample ID	Sample Type	Depth (ft)	SVOCs[a]	PCBs/ Pest.[b]	Inorganic Chemicals	Radionuclides
73-02151	0173-96-0101	Grab	0-0.67	1923	1923	1924	1925
73-02152	0173-96-0102	Grab	0-0.83	1923	1923	1924	1925
73-02153	0173-96-0103	Grab	0-0.67	1923	1923	1924	1925
73-02154	0173-96-0104	Grab	0-0.83	1923	1923	1924	1925
73-02154	0173-96-0105	Grab	0.83-1.67	1923	1923	1924	1925
73-02155	0173-96-0106	Grab	0-1.25	1923	1923	1924	1925
73-02156	0173-96-0107	Grab	0-0.83	1923	1923	1924	1925
73-02157	0173-96-0108	Grab	0.25-0.83	1923	1923	1924	1925
73-02158	0173-96-0109	Grab	0-0.83	1923	1923	1924	1925
73-02159	0173-96-0110	Grab	0-0.5	1923	1923	1924	1925
73-02160	0173-96-0111	Grab	0-0.5	1923	1923	1924	1925
73-02161	0173-96-0112	Grab	0-0.5	1923	1923	1924	1925
73-02162	0173-96-0113	Grab	0-1.0	1923	1923	1924	1925
73-02163	0173-96-0114	Grab	0-1.0	1923	1923	1924	1925
73-02163	0173-96-0118	Grab/ duplicate	0-1.0	1923	1923	1924	1925

[a] SVOCs = semivolatile organic compounds.

[b] PCBs/Pest. = polychlorinated biphenyls/pesticides.

The carcinogens were compared with their respective SALs. These SALs represent a one-in-a-million incremental risk of contracting cancer. The ratio of the maximum detected concentration of a carcinogen to its SAL quickly determines the incremental risk for exposure to the particular carcinogen. The total of all the ratios for all the carcinogens yields a total incremental risk for exposure to all the carcinogens simultaneously. The total of the ratios for all the carcinogens is 34, which corresponds to an incremental risk of 3.4×10^{-5}, or 3.4 in 100,000. Polyaromatic hydrocarbons account for 3.3×10^{-5} of the total risk. The NMED has indicated that a target risk of 1×10^{-5} is acceptable and the EPA range of acceptable risk is between 10^{-4} and 10^{-6}; therefore, no corrective action is required. Since the estimated carcinogenic risk of 3.4×10^{-5} is not significantly greater than the target risk, and because the contaminated sediment is of very limited extent and located on a relatively steep slope, the contamination in the drainages does not pose a potential unacceptable risk and supplemental sampling is not warranted at this time.

The one radionuclide detected above its fallout concentration, plutonium-239, was significantly less than its SAL. Using the ratio of the maximum concentration detected to SAL, which represents a dose of 15 mrem/yr, the maximum dose allowed by DOE-Albuquerque (AL) for releasing sites for unrestricted public use (DOE-AL 2000, 67153), the dose was calculated to be 0.06 mrem/yr. This is less than the 15-mrem/yr dose limit and therefore is acceptable.

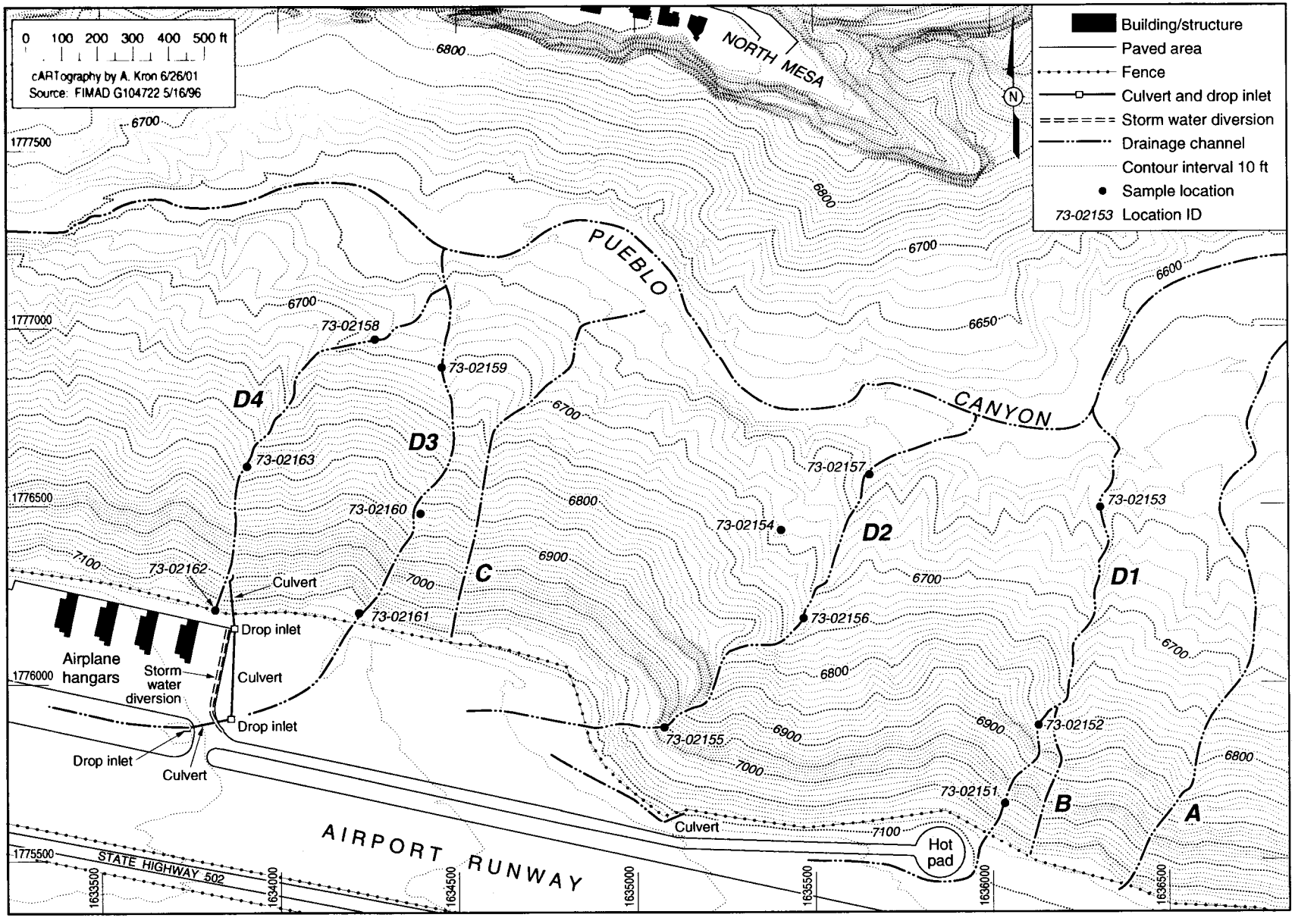

Figure 2.2-1. Channel sediment sampling locations

Table 2.2-2
PRS 73-001(a) Inorganic, Radionuclide, and Organic COPCs

Analyte	Location ID	Sample ID	Depth (ft)	Concentration[a]
Inorganics with concentrations at or above background values				
Beryllium	73-02161	0173-96-0112	0-0.5	1.9
Cadmium	73-02158	0173-96-0109	0-0.83	0.5
	73-02163	0173-96-0114	0-1	0.68
		0173-96-0118		0.63
Lead	73-02163	0173-96-0114	0-1	32.5
		0173-96-0118		48.4
Uranium, total	73-02163	0173-96-0114	0-1	8.1
Zinc	73-02156	0173-96-0107	0-0.83	53.7
	73-02161	0173-96-0112	0-0.5	56.3
	73-02163	0173-96-0114	0-1	234
		0173-96-0118		173
Radionuclides with concentrations at or above background/fallout values				
Cesium-137	73-02156	0173-96-0107	0-0.83	0.099(J)[b]
	73-02163	0173-96-0114	0-1	0.195
Plutonium-239	73-02151	0173-96-0101	0-0.67	0.052
	73-02153	0173-96-0103	0-0.67	0.027
	73-02156	0173-96-0107	0-0.83	0.043
	73-02158	0173-96-0109	0-0.83	0.171
	73-02162	0173-96-0113	0-1	0.0969
	73-02163	0173-96-0114	0-1	0.419
Detected organics				
Acenaphthene	73-02154	0173-96-0105	0.83-1.67	0.054(J)
	73-02156	0173-96-0107	0-0.83	0.043(J)
	73-02157	0173-96-0108	0.25-0.83	0.044(J)
	73-02158	0173-96-0109	0-0.83	0.64
Anthracene	73-02154	0173-96-0105	0.83-1.67	0.13(J)
	73-02155	0173-96-0106	0-1.25	0.035(J)
	73-02156	0173-96-0107	0-0.83	0.094(J)
	73-02157	0173-96-0108	0.25-0.83	0.089(J)
	73-02158	0173-96-0109	0-0.83	0.94
	73-02163	0173-96-0118	0-1	0.044(J)
Aroclor-1254	73-02163	0173-96-0114	0-1	0.12
		0173-96-0118	0-1	0.077

Table 2.2-2 (continued)

Analyte	Location ID	Sample ID	Depth (ft)	Concentration
Aroclor-1260	73-02151	0173-96-0101	0-0.67	0.055
	73-02155	0173-96-0106	0-1.25	0.089
Benzo(a)anthracene	73-02154	0173-96-0105	0.83-1.67	0.29(J)
	73-02155	0173-96-0106	0-1.25	0.094(J)
	73-02156	0173-96-0107	0-0.83	0.26(J)
	73-02157	0173-96-0108	0.25-0.83	0.3(J)
	73-02158	0173-96-0109	0-0.83	1.6
	73-02162	0173-96-0113	0-1	0.036(J)
	73-02163	0173-96-0114	0-1	0.081(J-)[c]
		0173-96-0118	0-1	0.11(J)
Benzo(a)pyrene	73-02154	0173-96-0105	0.83-1.67	0.34(J)
	73-02155	0173-96-0106	0-1.25	0.11(J)
	73-02156	0173-96-0107	0-0.83	0.31(J)
	73-02157	0173-96-0108	0.25-0.83	0.37
	73-02158	0173-96-0109	0-0.83	1.4
Benzo(b)fluoranthene	73-02154	0173-96-0105	0.83-1.67	0.25(J)
	73-02155	0173-96-0106	0-1.25	0.072(J)
	73-02156	0173-96-0107	0-0.83	0.23(J)
	73-02157	0173-96-0108	0.25-0.83	0.31(J)
	73-02158	0173-96-0109	0-0.83	1.4
	73-02163	0173-96-0114	0-1	0.095(J-)
Benzo(g,h,i)perylene	73-02154	0173-96-0105	0.83-1.67	0.23(J)
	73-02155	0173-96-0106	0-1.25	0.091(J)
	73-02156	0173-96-0107	0-0.83	0.26(J)
	73-02157	0173-96-0108	0.25-0.83	0.25(J)
	73-02158	0173-96-0109	0-0.83	0.92
Benzo(k)fluoranthene	73-02154	0173-96-0105	0.83-1.67	0.28(J)
	73-02155	0173-96-0106	0-1.25	0.089(J)
	73-02156	0173-96-0107	0-0.83	0.25(J)
	73-02157	0173-96-0108	0.25-0.83	0.28(J)
	73-02158	0173-96-0109	0-0.83	1.4
	73-02163	0173-96-0114	0-1	0.065(J-)
Bis(2-ethylhexyl) phthalate	73-02159	0173-96-0110	0-0.5	0.37(J)
	73-02163	0173-96-0118	0-1	0.04(J)
Chlordane (alpha-)	73-02163	0173-96-0114	0-1	0.0056
		0173-96-0118	0-1	0.0074

Table 2.2-2 (continued)

Analyte	Location ID	SampleID	Depth(ft)	Concentration
Chlordane (gamma-)	73-02158	0173-96-0109	0-0.83	0.0044
	73-02163	0173-96-0114	0-1	0.013
		0173-96-0118	0-1	0.015
Chrysene	73-02154	0173-96-0105	0.83-1.67	0.33(J)
	73-02155	0173-96-0106	0-1.25	0.11(J)
	73-02156	0173-96-0107	0-0.83	0.31(J)
	73-02157	0173-96-0108	0.25-0.83	0.34(J)
	73-02158	0173-96-0109	0-0.83	1.8
	73-02163	0173-96-0114	0-1	0.087(J-)
		0173-96-0118	0-1	0.11(J)
DDE [4,4-]	73-02157	0173-96-0108	0.25-0.83	0.0036
DDT [4,4-]	73-02155	0173-96-0106	0-1.25	0.0067
	73-02156	0173-96-0107	0-0.83	0.0093
	73-02157	0173-96-0108	0.25-0.83	0.019
	73-02158	0173-96-0109	0-0.83	0.038
	73-02162	0173-96-0113	0-1	0.0035
	73-02163	0173-96-0114	0-1	0.048
		0173-96-0118	0-1	0.057
Dibenz(a,h)anthracene	73-02154	0173-96-0105	0.83-1.67	0.072(J)
	73-02157	0173-96-0108	0.25-0.83	0.1(J)
	73-02158	0173-96-0109	0-0.83	0.24(J)
Dibenzofuran	73-02158	0173-96-0109	0-0.83	0.29(J)
Di-n-butylphthalate	73-02163	0173-96-0118	0-1	0.93
Fluoranthene	73-02154	0173-96-0104	0-0.83	0.043(J)
	73-02154	0173-96-0105	0.83-1.67	0.57
	73-02155	0173-96-0106	0-1.25	0.21(J)
	73-02156	0173-96-0107	0-0.83	0.57
	73-02157	0173-96-0108	0.25-0.83	0.58
	73-02158	0173-96-0109	0-0.83	3.8
	73-02162	0173-96-0113	0-1	0.05(J)
	73-02163	0173-96-0114	0-1	0.13(J-)
		0173-96-0118	0-1	0.18(J)
Fluorene	73-02154	0173-96-0105	0.83-1.67	0.065(J)
	73-02156	0173-96-0107	0-0.83	0.047(J)
	73-02158	0173-96-0109	0-0.83	0.52

Table 2.2-2 (continued)

Analyte	Location ID	Sample ID	Depth (ft)	Concentration[a]
Indeno(1,2,3-cd)pyrene	73-02154	0173-96-0105	0.83-1.67	0.21(J)
	73-02155	0173-96-0106	0-1.25	0.073(J)
	73-02156	0173-96-0107	0-0.83	0.21(J)
	73-02157	0173-96-0108	0.25-0.83	0.21(J)
	73-02158	0173-96-0109	0-0.83	0.85
Methylnaphthalene[2-}	73-02158	0173-96-0109	0-0.83	0.085(J)
Naphthalene	73-02158	0173-96-0109	0-0.83	0.43
Phenanthrene	73-02154	0173-96-0105	0.83-1.67	0.49
	73-02155	0173-96-0106	0-1.25	0.14(J)
	73-02156	0173-96-0107	0-0.83	0.38
	73-02157	0173-96-0108	0.25-0.83	0.35(J)
	73-02158	0173-96-0109	0-0.83	3
	73-02163	0173-96-0114	0-1	0.06(J)
		0173-96-0118	0-1	0.14(J)
Pyrene	73-02154	0173-96-0105	0.83-1.67	0.53
	73-02155	0173-96-0106	0-1.25	0.17(J)
	73-02156	0173-96-0107	0-0.83	0.46
	73-02157	0173-96-0108	0.25-0.83	0.56
	73-02158	0173-96-0109	0-0.83	2.7
	73-02162	0173-96-0113	0-1	0.06(J)
	73-02163	0173-96-0114	0-1	0.13(J-)
		0173-96-0118	0-1	0.27(J)

[a] Inorganic and organic chemical concentrations reported in milligrams/kilogram. Radionuclide concentrations reported in picocuries per gram.

[b] (J) = estimated value.

[c] (J-) = estimated value (biased low).

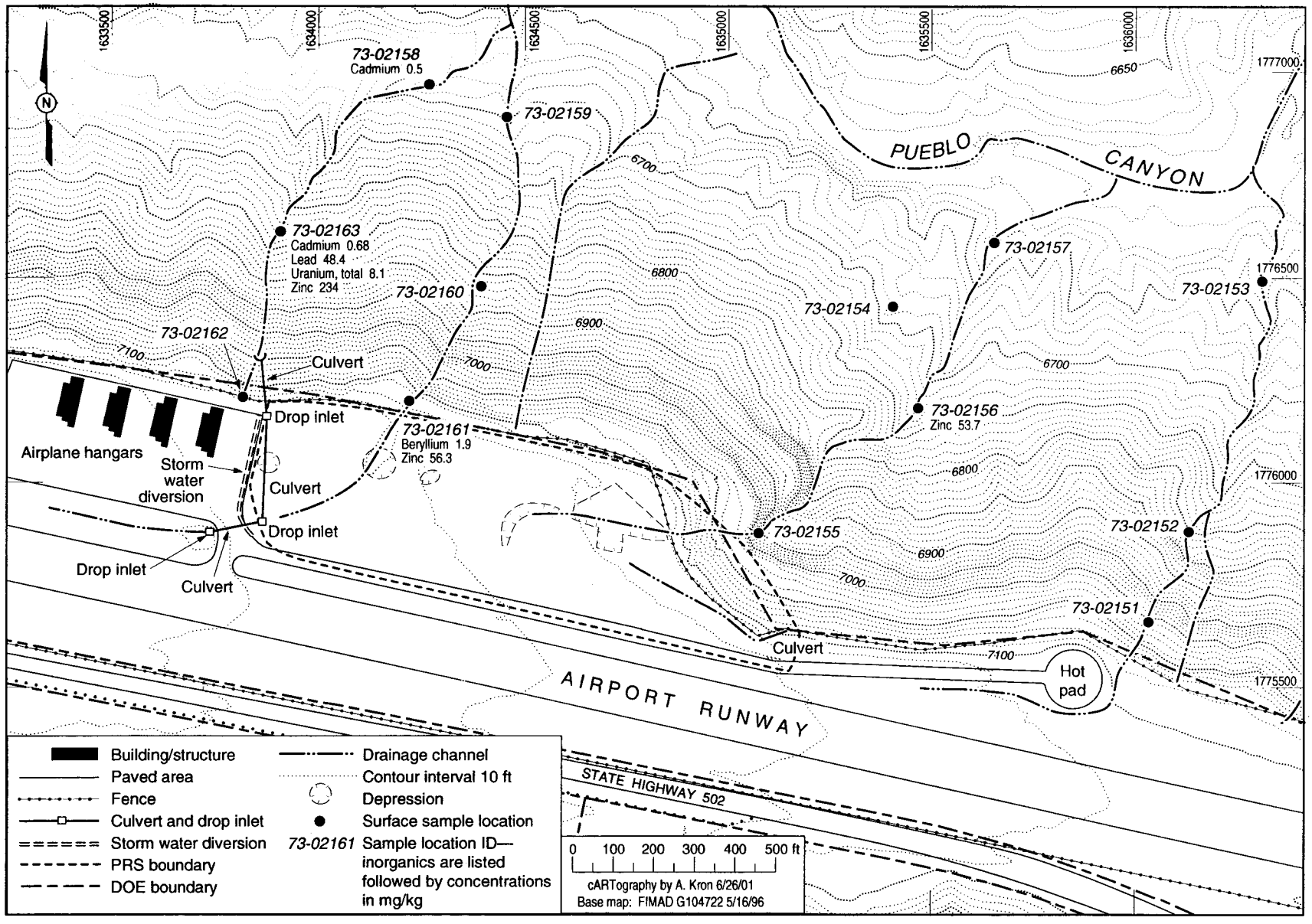

Figure 2.2-2. Inorganic COPCs in channel sediment samples with maximum concentrations shown by location

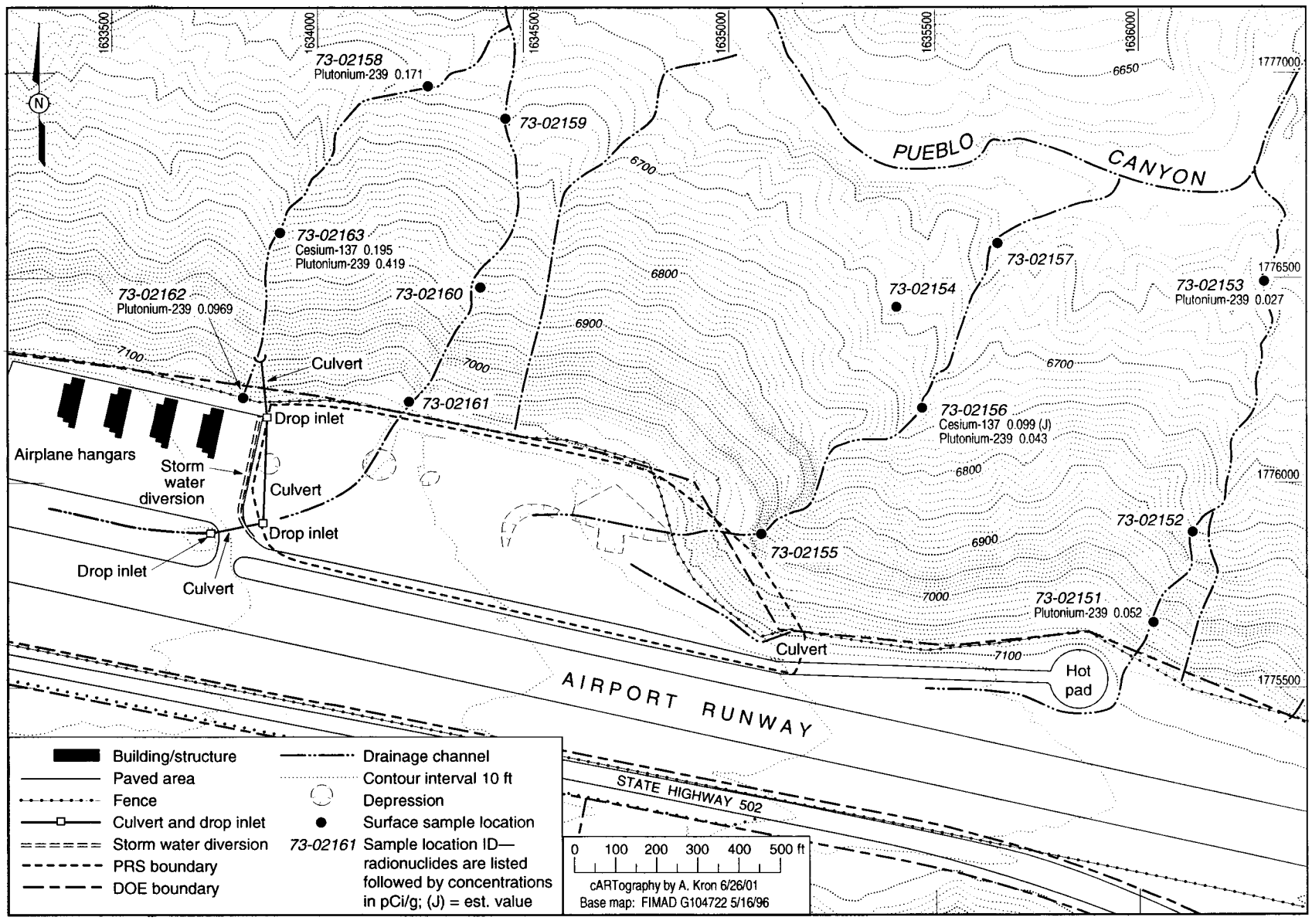

Figure 2.2-3. Radionuclide COPCs in channel sediment samples with maximum concentrations shown by location

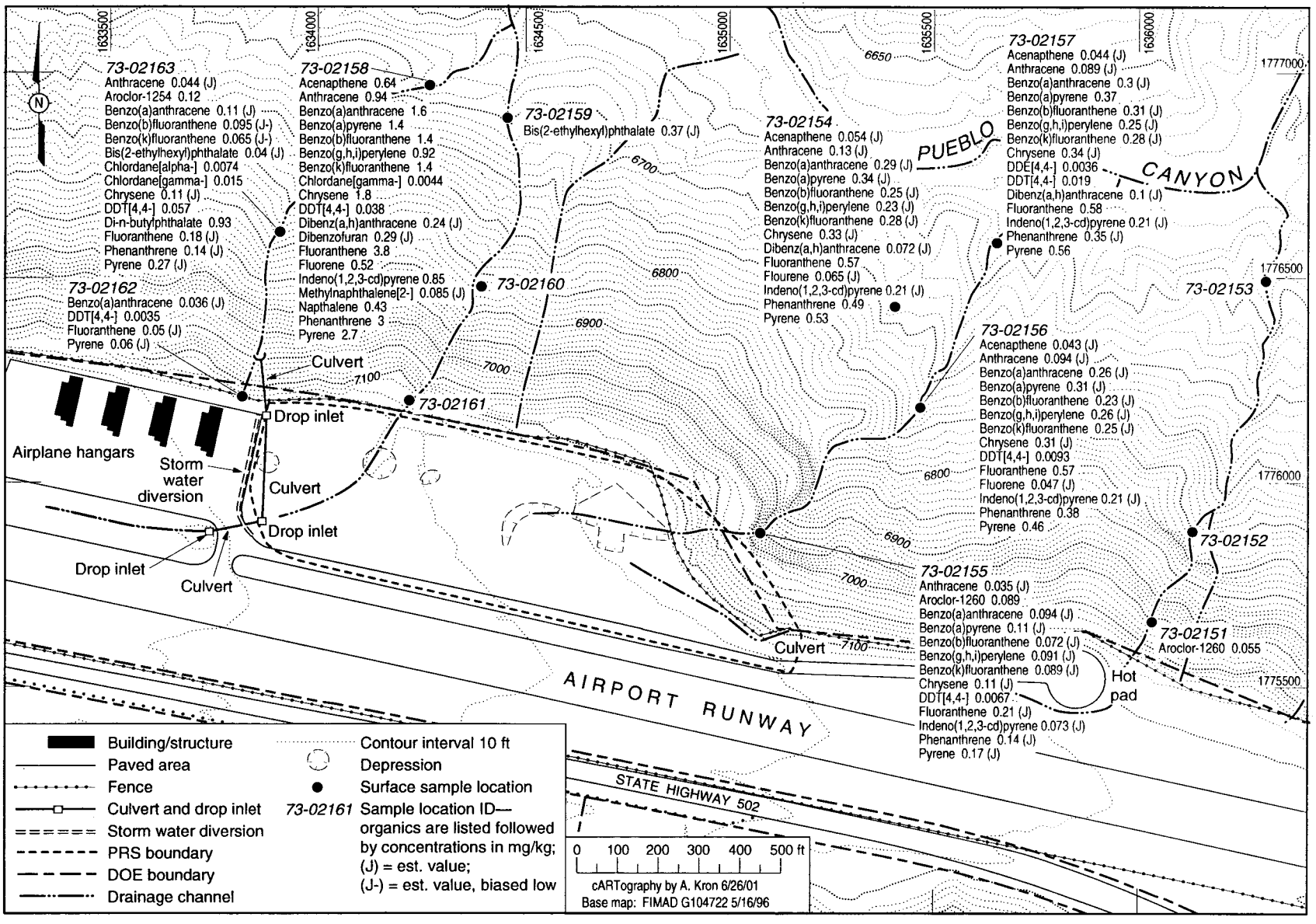

Figure 2.2-4. Detected organic compounds in channel sediment samples with maximum concentrations shown by location

Table 2.2-3
Noncarcinogenic COPCs Compared to SALs

COPC	Location ID	Maximum Concentration (mg/kg)	SAL (mg/kg)	HQ
Acenaphthene	73-02158	0.64	2800	0.0002
Anthracene	73-02158	0.94	22000	0.00004
Benzo(g,h,i)perylene[a]	73-02158	0.92	1800	0.0005
Cadmium	73-02163	0.68	70	0.01
Dibenzofuran	73-02163	0.29(J)	290	0.001
Di-n-butylphthalate	73-02163	0.93	6100	0.0002
Fluoranthene	73-02163	3.8	2300	0.002
Fluorene	73-02163	0.52	2100	0.0002
Lead	73-02163	48.4	400	0.1
Methylnaphthalene[2-][b]	73-02158	0.085(J)	53	0.002
Naphthalene	73-02158	0.43	53	0.008
Phenanthrene[c]	73-02158	3.0	1800	0.002
Pyrene	73-02158	2.7	1800	0.002
Uranium, total	73-02163	8.1	230	0.04
Zinc	73-02163	234	23000	0.01
			Total (HI)	0.2

[a] There is no SAL for benzo(g,h,i)perylene; therefore, the SAL for pyrene has been used as a surrogate, based on structural similarity.

[b] There is no SAL for 2-methylnaphthalene; therefore, the SAL for naphthalene has been used as a surrogate, based on structural similarity.

[c] There is no SAL for phenanthrene; therefore, the SAL for pyrene has been used as a surrogate, based on NMED technical document (NMED 2001, 68554).

2.2.2.2 Ecological

The maximum concentrations of COPCs are presented in Table 2.2-6 and compared to their respective minimum or final ecological screening levels (ESLs) (LANL 2000, RPF Record Package 186, version 2). This process evaluated eight terrestrial receptors representing several tropic levels. These receptors included

- generic plants,
- soil-dwelling invertebrates (represented by the earthworm),
- deer mouse (mammalian omnivore),
- vagrant shrew (mammalian insectivore),
- desert cottontail (mammalian herbivore),
- gray fox (mammalian carnivore),
- American robin (avian insectivore, avian omnivore, and avian herbivore), and

- American kestrel (avian invertebrate and flesh eater, a surrogate for threatened and endangered [T&E] avian species).

Since the debris slopes receive water only periodically during storm events and snowmelt, they do not support any aquatic communities. The rationale for these receptors is presented in "Screening Level Ecological Risk Assessment Methods" (LANL 1999, 64783).

Table 2.2-4
Carcinogenic COPCs Compared with SALs

COPC	Location ID	Maximum Concentration (mg/kg)	SAL (mg/kg)	Ratio of Maximum Concentration to SAL	Risk[a]
Aroclor-1254	73-02163	0.12	1.1	0.1	$1x10^{-7}$
Aroclor-1260	73-02155	0.089	0.22	0.4	$4x10^{-7}$
Benzo(a)anthracene	73-02158	1.6	0.62	2.6	$2.6x10^{-6}$
Benzo(a)pyrene	73-02158	1.4	0.062	22.6	$2.3x10^{-5}$
Benzo(b)fluoranthene	73-02158	1.4	0.62	2.3	$2.3x10^{-6}$
Benzo(k)fluoranthene	73-02158	1.4	6.2	0.2	$2x10^{-7}$
Bis(2-ethylhexyl)phthalate	73-02159	0.37(J)	35	0.01	$1x10^{-8}$
Chlordane (alpha-)	73-02163	0.0074	1.6	0.01	$1x10^{-8}$
Chlordane (gamma)	73-02163	0.015	1.6	0.01	$1x10^{-8}$
Chrysene	73-02158	1.8	61	0.03	$3x10^{-8}$
DDE (4,4')	73-02157	0.0036	1.7	0.002	$2x10^{-9}$
DDT (4,4')	73-02163	0.057	1.7	0.03	$3x10^{-8}$
Dibenz(a,h)anthracene	73-02158	0.24(J)	0.062	3.87	$3.9x10^{-6}$
Indeno(1,2,3-cd)pyrene	73-02158	0.85	0.62	1.37	$1.4x10^{-6}$
				Total incremental risk	$3.4x10^{-5}$

[a] Risk is calculated by dividing the ratio of the maximum concentration to the SAL by one million.

Table 2.2-5
Radionuclide COPCs Compared to SALs

COPC	Location ID	Maximum Concentration (pCi/g)	SAL (pCi/g)	Ratio of Maximum Concentration to SAL	Dose[a] (mrem/yr)
Plutonium-239	73-02163	0.419	110	0.004	0.06

[a] Dose is calculated by multiplying the ratio of the maximum concentration to the SAL by 15 mrem/yr.

The final ESL is compared to the maximum detected concentration in Table 2.2-6. An HQ was calculated for each chemical by dividing the maximum detected concentration by the final ESL. A HQ equal to or greater than 0.3 was used as a threshold to identify chemicals of potential ecological concern (COPECs) and determine which chemicals needed to be evaluated further (LANL 1999, 64783.1).

Table 2.2-6
Comparison of Maximum Concentrations with Final ESLs

COPC	Location ID	Maximum Concentration (mg/kg)	Final ESL	HQ Ratio of Maximum Concentration to Final ESL	Receptor	COPEC (yes/no)
Acenaphthene	73-02158	0.64	2.5	0.3	Generic plant	no
Anthracene	73-02158	0.94	2200	0.0004	Vagrant shrew	no
Aroclor-1254	**73-02163**	**0.12**	**0.12**	**1**	**Vagrant shrew (insectivore)**	**yes**
Aroclor-1260	**73-02155**	**0.089**	**0.05**	**1.78**	**American robin (insectivore)**	**yes**
Benzo(a)anthracene	**73-02158**	**1.6**	**3.3**	**0.5**	**Vagrant shrew (insectivore)**	**yes**
Benzo(a)pyrene	**73-02158**	**1.4**	**1.8**	**0.8**	**Vagrant shrew (insectivore)**	**yes**
Benzo(b)fluoranthene	73-02158	1.4	7.4	0.2	Vagrant shrew (insectivore)	no
Benzo(g,h,i)perylene	73-02158	0.92	12	0.1	Vagrant shrew (insectivore)	no
Benzo(k)fluoranthene	73-02158	1.4	13	0.1	Vagrant shrew (insectivore)	no
Bis(2-ethylhexyl) phthalate	**73-02159**	**0.37(J)**	**0.24**	**1.54**	**American kestrel (100% carnivore)**	**yes**
Cadmium	**73-02163**	**0.68**	**1**	**0.7**	**Generic plant**	**yes**
Chlordane (alpha)	73-02163	0.0074	2.1	0.003	American robin (insectivore)	no
Chlordane (gamma)	73-02163	0.015	2.1	0.007	American robin (insectivore)	no
Chrysene	**73-02158**	**1.8**	**3.3**	**0.5**	**Vagrant shrew (insectivore)**	**yes**
DDE (4,4')	**73-02157**	**0.0036**	**0.0018**	**2**	**American kestrel (100% carnivore)**	**yes**
DDT (4,4')	**73-02163**	**0.057**	**0.0028**	**20.357**	**American robin (insectivore)**	**yes**
Dibenz(a,h) anthracene	73-02158	0.24(J)	2.3	0.1	Vagrant shrew	no
Dibenzofuran	73-02163	0.29(J)	61	0.005	Generic plant	no
Di-n-butylphthalate	**73-02163**	**0.93**	**0.17**	**5.47**	**American robin (insectivore)**	**yes**
Fluoranthene	73-02163	3.8	26	0.1	Vagrant shrew	no
Fluorene	73-02163	0.52	29	0.02	Vagrant shrew	no
Indeno(1,2,3-cd) pyrene	73-02158	0.85	12	0.07	Vagrant shrew	no
Lead	**73-02163**	**48.4**	**76**	**0.6**	**American robin (herbivore)**	**yes**
Methynaphthalene[2-]	73-02158	0.085(J)	6	0.01	Vagrant shrew (insectivore)	no
Naphthalene	**73-02158**	**0.43**	**0.2**	**2.2**	**American robin (insectivore)**	**yes**
Phenanthrene	73-02158	3	110	0.03	Vagrant shrew (insectivore)	no
Plutonium-239	73-02163	0.419	18	0.02	Earthworm	no
Pyrene	73-02158	2.7	15	0.2	Vagrant shrew (insectivore)	no
Uranium, total	**73-02163**	**8.1**	**5**	**1.6**	**Generic plant**	**yes**
Zinc	**73-02163**	**234**	**10**	**23**	**Generic plant**	**yes**

Aroclor-1254; Aroclor-1260; benzo(a)anthracene; benzo(a)pyrene; bis(2-ethylhexyl)phthalate; cadmium, chrysene; 4,4'-DDE, 4,4'DDT; di-n-butylphthalate; lead; naphthalene; total uranium; and zinc all had HQs of 0.3 or greater and are bolded in Table 2.2-6.

The COPECs identified in Table 2.2-6 were further evaluated by calculating the HQs for each COPEC/receptor combination as well as the HIs for each receptor. The HQ for each COPEC for each receptor is calculated by dividing the ESL for each receptor by the maximum detected concentration for

each COPEC. The HI is the sum of HQs for chemicals with common toxicological endpoints for a given receptor. The HI analysis provides a clearer picture of potential adverse impacts by determining how many receptors may be affected and provides information on T&E species. Table 2.2-7 presents a summary of the HI analysis for the debris slopes.

The HIs are less than 1.0 for the earthworm, the desert cottontail, and the red fox (Table 2.2-7). This indicates that the residual chemicals on the debris slopes are not present in concentrations considered harmful to the earthworm, desert cottontail, and red fox. HIs for the other receptors range from approximately 3 for the deer mouse to 33 for the insectivore robin, indicating the possibility of harm to these receptors. However, because these HIs assume extended or full time contact, and because of limited extent (i.e., contamination is limited to very narrow drainage channels), the amount of actual exposure each receptor would have to these chemicals would be limited due to their minimal contact time at a contaminated location. In addition, the vegetation currently growing in the drainages appears healthy with no obvious stress resulting from the presence of the COPECs in the sediment.

3.0 BASIS FOR CLEANUP LEVELS

The following criteria were developed by the members of the Airport Landfill High Performing Team, concurred on by the New Mexico Environment Department (NMED) bureau chiefs affected, and proposed to the US Environmental Protection Agency (EPA) for this site. All agencies, state and federal, are now in agreement that meeting the following criteria within the identified areas will constitute the successful completion of this IM.

1. All refuse, including tires, wood debris, auto parts, and other metal scrap, in and around the several drainage channels should be removed, except those items that are substantially buried and therefore pose no reasonable potential to move. As a practical matter, items that are less than 50% buried in sediment should be removed. Items buried greater than 50% and most concrete shall remain provided the concrete does not exhibit visible staining that could be associated with contamination and is not a threat to mobilize by runoff. Items whose removal presents a real and credible threat to worker health and safety may also remain in place.

2. Appropriate best management practices (BMPs) should be installed where needed to prevent the movement of disturbed soil or other contaminants into surface water. All erosion control measures must be inspected and maintained on a regular basis to insure and assess their effectiveness.

3. At the base of the drainages containing refuse, one or more retention structures (or equivalent) should be constructed to control the potential pollutant load. These sources may contribute to waters of the US. Such structures should be constructed to and control stormwater runoff from the landfill drainages and allow routine sampling.

4. If, after storm events, there is insufficient water to sample, it may be reasonably argued that no discharge from the drainages has occurred and, therefore, no water sampling/analysis is required. In addition, water sampling and analysis may be necessary for only one landfill drainage if it can be demonstrated that other drainage outfalls are "substantially identical" (i.e., show similar significant sources of pollutants and stormwater discharge volumes; see 40 CFR 122.26, Storm Water Discharges, and Part 5.2.4 of the National Pollutant Discharge Elimination System [NPDES]). Finally, sampling and analysis must be performed in accordance with 40 CFR 136 and the NPDES storm water multi-sector general permit (MSGP) for industrial activities (65 FR 64746).

Table 2.2-7
Channel Sediment Samples Hazard Index Analysis for Debris Slopes

COPECs	Maximum Concentration (mg/kg)	HQ Plant	HQ Invertebrate (earthworm)	HQ Deer Mouse	HQ Vagrant Shrew	HQ Desert Cottontail	HQ Robin Insectivore	HQ Robin Omnivore	HQ Robin Herbivore	HQ Kestrel (intermediate carnivore)	HQ Kestrel (100% carnivore)	HQ Red Fox
Aroclor-1254	0.12	0.01	—	0.46	1	0.006	—	—	—	—	0.13	0.16
Aroclor-1260	0.089	—	—	0.59	—	0.007	1.78	0.9	0.07	0.468	0.45	0.24
Benzo(a) anthracene	1.6	0.1	—	0.2	0.5	0.004	—	—	—	—	—	0.04
Benzo(a)-pyrene	1.4	—	—	0.4	0.8	0.004	—	—	—		—	0.2
Bis(2-ethylhexyl) phthalate	0.37(J)	—	—	0.01	0.0128	5E-05	0.37	0.2	0.01	0.82	1.5	0.04
Cadmium	0.68	0.68	0.068	0.08	0.09	0.04	0.12	0.1	0.1	0.02	0.001	0.001
Chrysene	1.8	—	—	0.3	0.5	0.004	—	—	—		—	0.04
4,4'-DDE	0.0036	—	—	0.0001	0.0002	1E-06	1.6	0.8	0.06	1.2	2	0.0002
4,4'-DDT	0.057	—	—	0.02	0.04	0.0002	20.4	10.4	0.76	9.66	13.26	0.02
Di-n-butylphthalate	0.93	0.004	—	0.0004	0.001	2E-05	5.47	2.9	0.44	0.78	0.05	6.2E-06
Lead	48.4	0.1	0.02	0.1	0.2	0.09	0.5	0.55	0.6	0.04	0.02	0.01
Naphthalene	0.43	—	—	0.02	0.04		2.15	1.4	0.59	0.31	—	0.0001
Uranium	8.1	1.6	—	0.1	0. 3	0.006	0.4	0.21	0.04	0.05	0.003	0.002
Zinc	234	23.4	0.7	0.3	0.1	0.2	0. 3	0.7	1	0.04	0.03	0.01
HI	—	25.9	0.8	2.6	4.8	0.4	33	18	3.7	13.4	17.5	0.7

5. Routine inspection and maintenance of the retention structure(s) is required to ensure that they are functioning as intended.

6. To prevent significant run-on, the landfill cap design for solid waste management units (SWMUs) 73-001(a,b,c,d) and 73-004(d) must include structural and/or nonstructural controls to divert stormwater away from the drainages.

7. In accordance with Part 4.0 of the MSGP and 40 CFR 122.26, it is the responsibility of the permittee to develop, maintain, and implement a site-specific Storm Water Pollution Prevention Plan (SWPPP). All activities related to the landfill drainages, for example, should be documented in the site-specific SWPPP.

8. All activities will be required to comply with all other state and federal regulations.

4.0 PROPOSED INTERIM MEASURE

4.1 Conceptual Model

The landfill debris found in four drainages along the north side of Pueblo Canyon are a result of approximately 30 years of use by DOE and it's predecessor agencies, and the Los Alamos County. Debris is generally found in and along each drainage thalweg, though scattered debris can be found up side slopes along the various drainages. While there is no appreciable migration of debris items toward the bottom of Pueblo Canyon there remains some uncertainty regarding contaminant migration resulting from precipitation events.

The greatest concentration of debris and most of the gross volume resides in drainage designated as D2 (Figure 2.1-2). This drainage contains mostly of the rubber tires, 3-4 automobile bodies or chassis, at least one engine block and several large wooden spools typically associated with industrial cable. The majority of the visible tires located along the drainage invert contain or are buried by sediments accumulated over a 50 year span. Drainage D1 contains less total debris volume. Composition is primarily small tires, 2-3 car bodies and approximately eight drums. Most drums appear to be empty or contain a tar-like substance. There are no records to indicated what, if anything the drums initially stored. Drainages D3 and D4 contain primarily small, thin-walled, metal scraps. There is a potential for debris to migrate down gradient toward the bottom of Pueblo Canyon, a tributary to the Rio Grande.

Chemical and radiological data collected during the RFI are shown in tables 2.2-1 through 2.2-6. Concentrations of semi-volatile organics, metals and radionuclides found in these four drainages but at fairly low concentrations. Other than constituents of PAHs, no COPCs were identified at concentrations greater than SALs. The highest concentrations for most analytes were detected in sediment samples collected in drainage D4 (Figures 2.2-2 through 2.2-4).

4.2 Supplemental Sampling Activities

Based on a review of the existing chemical data for the sediment within the four primary drainages sampled during the RFI, it was determined that supplemental sediment sampling was not necessary prior to debris removal. However, for health and safety and waste characterization purposes, a preliminary site walkover with hand-held radiation meters will be done to screen debris and surrounding soil for radioactive contamination before debris removal begins. For waste management purposes only, a percentage of the removed debris will be swiped and counted to confirm that no radioactive contamination exists.

During debris removal, if an unknown material, sludge or liquid, is encountered in any kind of a container, samples of this material will be collected and analyzed per the waste characterization strategy form (WCSF).

4.3 Cleanup Activities

The essential components of this IM Plan are:

- Identification of clean-up criteria
- Removal of debris from four drainages
- Waste segregation and disposal
- Confirmatory sampling and analysis
- Site restoration and erosions control
- Completion of the IM Completion Report

In selection of the method for removing debris from the drainages, the following options were considered:

- Manual removal—Hand-carry debris to a staging area where it would be loaded onto trucks for disposal. (Note: Some manual removal activities are common to all remedial options.)
- Crane—Use a crane positioned at the mesa top to remove debris below
- Cable/pulley system—Construct a steel cable-and-pulley system to move debris from the slope to the staging area. Possible anchor points for the cable could be two bulldozers or a combination of a bulldozer and a tower/derrick.
- Helicopter—Use a helicopter to remove heavier debris and consolidated debris packages not easily accessible.
- Skyline Cableway and Carriage System (yarder)—Employs a carriage suspended from a cable. Cable extends from crane or tower at mesa top to anchor point at canyon bottom. Debris is mechanically removed.
- Construct Haul Road —Construct a road at least part of the way up the side of the mesa to facilitate debris removal from areas where the largest concentrations of debris are located.

The criteria used to evaluate each option included worker health and safety, environmental impact, approximate cost, load capacity, mobility, and availability. Appendix B describes the proposed options and the advantages and disadvantages that were considered in selection of the removal method.

Implementation of the IM will meet or exceed cleanup criteria established by NMED and DOE and endorsed by EPA through correspondence dated October 3, 2001, and April 16, 2002, respectively and presented in Section 3.0 of this plan.

4.4 Selected Removal Method

Manual Removal. All of the methods considered in this plan require that each debris item be touched or moved manually. Whether debris is lifted by crane or helicopter or attached to a cable pulley system,

there would be a need for debris to be handled by workers for consolidation or loading into baskets, carts or carriages to be retrieved and transported by the cable system described below. There is considerable debris scattered along each of the four drainages. Debris items that can not conveniently or efficiently be retrieved and removed by mechanical methods will be carried manually down the nearest drainage to staging points at the bottom of Pueblo Canyon for pick up. Some of the heavy or bulky items will require dismantling by cutting or chopping prior to carry out. No spark or flame generating equipment will be used without precautions in place for managing fire hazards.

Mechanical Removal. The greatest volume of debris will be removed using a Skyline cable and carriage system. These systems are very effective in removing material from environmentally sensitive areas with steep and undulating terrain such as the south side of Pueblo Canyon. A Skyline logging consultant toured the site and advised DOE that this technology would be effective in achieving the desired result debris removal. Use of this system will enable DOE to remove all required debris and at the same time minimize impacts to the environment. In general this system requires rigging a cable from a crane or tower positioned on the mesa top at the Los Alamos County Airport to an anchor point near the road at the bottom of Pueblo Canyon. Debris will be loaded into a carriage suspended from this stationary cable or main line. The carriage is controlled by a second cable extending from a winch, fixed below the tower, to the carriage. The empty carriage is deployed down the mainline via gravity. Once loaded, the carriage will be retrieved by the winch at the tower. Each carriage is equipped with an independent motor, winch and cable to facilitate retrieval of debris located along the side slopes of the four drainages. The capability to retrieve material that is not directly under the main line is a key element in reducing manual handling of individual debris items, but the greatest benefit of this system may be to worker safety. In the government's evaluation of the option to use a helicopter for debris removal it was noted that manual labor would be required to loosen, lift and carry each item to a collection bin. The helicopter would be employed to pick up bins once filled but first, each item must be hand-carried across steep, rocky terrain and loaded into a bin. An advantage of the skyline system is it's capability to remove individual or multiple items located laterally, away from the alignment of the mainline cable. Once the cable is threaded through one or more tires, or a hook attached to an object, retrieval will be mechanical. This job is inherently dangerous, but minimizing the number of trips required required by workers to remove the total volume of debris will greatly reduce associated safety risks. This auxiliary cable system will reduce the need to reposition the cable system. It is expected that they cable system will be moved no more than eight times after initial set up. Details of Skyline Logging equipment and performance are available on-line at www.forestengineer.com and are summarized in Appendix C, see also Figure C-1..

4.5 IM Implementation Phases

The preferred alternative approach for this IM will utilize some aspects of several of the considered alternatives. The following section outlines the general steps to be undertaken in the IM execution; specific tasks will be in accordance with ER Project standard operating procedures (SOPs), quality procedures, and health and safety documents, and may be modified depending upon site conditions at the time the work is implemented.

Phase I (set up and site preparation)

- A haul/access road will be engineered and constructed as necessary from the airport hotpad taxiway to the canyon edge. This road will be adequate to support the yarder tower.
- The yarder will be mobilized to the site and staged at the top of the first drainage.
- A light gauge pilot cable will be manually carried to an anchor point at the bottom of Pueblo Canyon to establish the alignment of the mainline cable. One end of the pilot cable is attached to the mainline

the other to a wench. Once the cable is optimally aligned, the mainline cable follows this alignment as the wench is activated. The mainline cable will be anchored to a tree if suitable or a vehicle of sufficient mass if no suitable tree is available. To eliminate fire hazard associated with heat buildup by friction due to the cable contacting trees, some trees may be removed. No improvement to the road along the bottom of Pueblo Canyon is anticipated.

- A 5,000 gal. water tanker truck will be on site during this phase of the project.
- Preliminary site and debris screening will be conducted for worker exposure protection.
- Stormwater retention structures will be installed at the foot of each drainage that contain debris, to retard stormwater runoff and to provide an adequate pool for stormwater sampling. BMPs will be installed as necessary to stabilize disturbed slopes.

Phase II (debris removal and disposal)

- Material will be removed from the drainages by the skyline carriage system and offloaded to staging areas for waste segregation. Materials will be segregated and compacted, as possible, and prepared for final disposal. Debris located close to the canyon bottom will be carried manually to haul vehicles and driven to the mesa top staging area. Segregated materials will be loaded into rolloff bins.
- Suspect items will be sampled as necessary to define their waste categories. Bulk debris will be screened for radiological contamination prior to transport.
- Recyclables will be transported to the appropriate recycling location and wastes will be disposed of as appropriate.
- Portable particulate samplers will monitor ambient atmospheric conditions at the site during the removal phase of this project.

Phase III (Sediment sampling and analysis)

- Confirmatory samples will be collected and analyzed according to this IM plan (Section 5.0).
- In general site restoration will begin following sediment sampling, however, areas that are heavily damaged or impacted by the removal of debris will be stabilized at once to prevent erosion.
- A field summary report will be prepared and the site inspected by DOE, Department of Defense, and the NMED.

4.6 Storm Water Control and Site Restoration

Prior to removal of debris from any of the four drainages control measures will be installed at each drainage to retard surface water runoff generated by precipitation events during the removal phase of this project. These retention structures will also serve as catchment basins to retain surface water runoff for sample collection and to reduce or eliminate downward migration of pollutants. These retention structures will be earthen berm with plastic liners on the upstream face and will not be designed to catch all precipitation events or ensure zero runoff from the site.

During the debris removal phase of this project some disturbance of soils in the drainages will occur as much of the debris is covered, to some degree, by sediments. To minimize soil erosion flow retarding measures will be installed such as wattles, jute matting and straw bales. Site restoration work will be

completed on a drainage-by-drainage basis after the cleanup criteria have been satisfied, confirmatory samples have been collected, sample results have been reviewed, and a determination made that no soil removal or additional sampling are required. Once site restoration activities are completed, disturbed areas will be covered with jute matting to stabilize soils and aid in establishment of vegetation. All soil stabilization features will be anchored to maintain position on the side slope of Pueblo Canyon. Site restoration work will be initiated after the removal phase. Site restoration work, including any stormwater BMPs, will be performed in accordance with an approved SWPPP.

5.0 CONFIRMATORY SAMPLING

Following debris removal, confirmatory soil samples will be collected to determine if residual contamination exists or is present. Confirmatory samples will be collected at 15 locations per drainage; however, the actual number and distribution of these sample locations will be determined following debris removal. In general, if there is no visible evidence of contamination beneath removed debris, confirmatory samples will be collected at approximately 30-ft intervals. As a standard practice, confirmatory samples will also be collected from any stained soil beneath removed debris. The samples will be surface soil or sediment grab samples collected using the spade-and-scoop technique. At sample locations where the soils are more than 24 in. deep, a second sample will be collected approximately 2 ft below the first. The samples will be analyzed for analytical suites consisting of total analyte list (TAL) metals (inorganic chemicals), semivolatile organic compounds (SVOCs), perclorate, pesticides/polychlorinated byphenyls (PCBs), and selected radionuclides (plutonium-239, cesium-137, and strontium-90). The samples will be handled pursuant to all pertinent SOPs.

Following data validation, the confirmatory sample data will be reviewed and assessed to determine if contamination is present in the drainages. A determination of nature and extent of contamination is beyond the scope of this IM.

6.0 WASTE MANAGEMENT

All wastes will be staged and handled in accordance with 20.4.1 NMAC, Subpart III, Part 262, Standards Applicable to Generators of Hazardous Waste and New Mexico Solid Waste Management Regulations. All debris will be segregated either at the mesa top or along the bottom of Pueblo Canyon. Waste segregation will be based on recyclable materials, non-recyclable material and hazardous waste. Hazardous wastes will be stored in roll-off bins and transported to industrial or special waste landfills such as Rio Rancho or as appropriate. Haul trucks specifically designed to handle and transport roll-offs will facilitate transport.

6.1 Estimated Types and Volumes of Waste

Based on preliminary site reconnaissance visits, most of the surface debris consist of tires and scrap metal. The scrap metal will include empty drums, car bodies, galvanized steel trash cans, engine blocks, washing machines, and other miscellaneous items. The volume of these wastes is estimated at approximately 600 yd^3.

6.2 Method of Management and Disposal

The debris will all be moved to a staging area where it can be segregated into recyclables and disposables. All tires will be transported to the tire recycling area at the Los Alamos County Landfill. Scrap metal that can be recycled will first be compacted, if possible, using a backhoe or other piece of

heavy equipment. The recyclable metal will then be transported to a recycling facility. Disposable debris will be profiled and disposed of at the Los Alamos County Landfill. All waste management and disposal will be conducted pursuant to the WCSF.

Even though much of the debris will be screened with hand-held radiation meters before field activities begin, a certain percentage of the debris will be swiped and counted before being released for recycling or disposal.

If unidentifiable sludges or liquids are encountered in any drums or other containers, they will be sampled and analyzed prior to disposal pursuant to the WCSF.

7.0 PROPOSED SCHEDULE AND UNCERTAINTIES

7.1 Proposed Schedule of Activities

Table 7.1-1 presents an approximate schedule of activities. Currently, the many uncertainties regarding the planning of the overall task make it impossible to provide a detailed schedule with start and end dates for the various subtasks. Therefore, the schedule has been expressed in approximate activity duration (working days). Even activity duration can be significantly impacted by changes in scope or in the details of how a subtask is completed.

Table 7.1-1
Approximate Schedule of Activities

Subtask	Activity Duration
Readiness Preparation and Review	20 days
Field preparation/mobilization	10 days
Debris removal/disposal	40 days
Sampling	10 days
Sample analyses	45 days
IM report draft preparation	30 days

7.2 Uncertainties

Numerous uncertainties may affect the approximate schedule of activities, some of which are discussed below:

- Debris volume. To date, four drainages have been identified that contain concentrations of debris that will require removal. If additional drainages are discovered that contain debris, the level of effort required for debris removal will increase accordingly. The volume of debris in the four drainages is largely unknown. However, for the purposes of cost estimating and scheduling, a total of 600 yd^3 of debris has been assumed (150 yd^3 per drainage). Although this is thought to be a conservative estimate, the actual volume of debris could be significantly higher, thereby increasing the removal time.

- Skyline system removal rate. It is expected that debris removal can be completed in 8 weeks. Uncertainties are associated with the number of working hours per day and may be affected by airport operations, weather, and residents living across from the site.

- Ease of removal. Debris may be much more difficult to move into staging areas than is expected.
- Haul roads can be constructed across existing landfill surface.

Other factors that could adversely impact the project duration are (1) inclement weather, particularly freezing weather and snow if the project is delayed into the winter months; (2) the discovery of chemical contamination which could, in turn, result in delays while determining risk to workers, performing additional worker health and safety training, and/or additional waste management; (3) fire restrictions that preclude working or limit the types of tasks that can be accomplished; (4) equipment availability, and (5) T&E species present in Pueblo Canyon.

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Appendix A

Acronyms and Abbreviations

BMP	best management practice
COPC	chemical of potential concern
COPEC	chemical of potential ecological concern
DOE	US Department of Energy
EPA	US Environmental Protection Agency
ER	environmental restoration
ESL	ecological screening level
HI	hazard index
HQ	hazard quotient
HSWA	Hazardous and Solid Waste Amendments of 1984
IM	interim measure
MGSP	NPDES Storm Water Multi-Sector General Permit
NMED	New Mexico Environment Department
NPDES	National Pollutant Discharge Elimination System
PCB	polychlorinated biphenyl
PRS	potential release site
QA/QC	quality assurance/quality control
RCRA	Resource Conservation and Recovery Act
RFI	RCRA facility investigation
SAL	screening action level
SOP	standard operating procedure
SVOC	semivolatile organic compound
SWPPP	Storm Water Pollution Prevention Plan
T&E	threatened and endangered
TA	technical area
TAL	target analyte list
VCM	voluntary corrective measure
WCSF	waste characterization strategy form

Appendix B

Interim Measure Options

The primary objective of this IM is to remove surface debris from the drainage ravines and intervening areas downgradient of PRS 73-001(a). Of the six options considered for debris removal, five (manual removal, crane, cable/pulley system, skyline logging and helicopter) are evaluated below. The remaining option was eliminated from further consideration for the reasons described below. Field activities within each drainage generally involve a combination of two or more of these options. Because the actual capability and effectiveness of the four selected options will be somewhat unknown until fieldwork begins, the final form and design of the debris recovery effort in each drainage probably will evolve as the field effort progresses. Each option will be continually evaluated under actual field conditions, and design or procedural changes may be made frequently to increase safety or debris removal efficiency.

The option of building a road up the side of the mesa was eliminated from further consideration because of the extreme amount of environmental damage that would occur during construction and because of the hazards inherent in operating heavy machinery on a steep slope. However, the possibility of driving a bulldozer partway up the slope for use as an anchor point may still be considered.

Debris removal first would require using hand-held tools such as shovels, picks and pry bars, and manual or power-activated winches to loosen the tires and other debris from the surrounding sediment. Any sediment adhering to the debris will then be removed. In addition, large pieces of debris-such as car bodies may be cut into smaller pieces to facilitate removal. These activities will be required prior to debris removal by any of the mechanical removal options.

General discussions of the five options selected as the most capable of achieving the primary objective are presented below.

Manual Removal

A totally manual removal would involve hand carrying, rolling, or dragging as much of the debris as possible to the existing road at the bottom of the canyon where it could be staged and loaded onto trucks. This would be practical only for smaller and lighter debris, and for debris that is already close to the bottom of the canyon. As distance from the road increases, this method of removal would become less efficient and more hazardous for the workmen. However, mechanical aides such as lightweight winches could possibly be set up at strategic positions to assist the workmen, thereby increasing the distance from which debris could be efficiently moved by hand. Besides size and weight of the debris, and distance from the bottom of the canyon, another limiting factor for manual removal is the steepness/ruggedness of the terrain over which the debris must be moved. If a road were constructed, manual removal could even be a viable option for debris closer to the mesa top; however, due to the environmental damage, Threatened and Endangered Species considerations, and road worker safety concerns, installing a road up the side of the canyon will require additional, detailed evaluation.

Extensive handling of the debris will be a component of any debris-removal scenario. Debris that is already near the bottom of the canyon and any other debris that could be efficiently and safely moved by hand, as determined by the field team leader and site safety officer, may be manually moved to the existing road at the canyon bottom regardless of the method used to remove the remainder of the debris.

Advantages

- Worker health and safety. As long as the pathways for carrying debris are kept relatively short and unobstructed, the health and safety risk of significant injury should be low. However, as distances and slope angles increase, and the terrain becomes more irregular, health and safety concerns will increase, thereby making the health and safety aspects of manual removal a disadvantage.

- Environment. Manual removal would cause the least amount of disturbance to the environment. However, continually carrying or dragging debris over the same pathway eventually could create environmental damage that would require the installation of more extensive stormwater BMPs and restoration.

- Cost. Over the short term, or for very limited scope, manual removal would be the least expensive option.

Disadvantages

- Load capacity. Workmen would be restricted to relatively light loads (<50 LB) that could be hand-carried or easily moved with the assistance of lightweight winches.

- Mobility. Workmen would be restricted to moving debris that is already near the bottom of Pueblo Canyon and that is located in terrain that is not too irregular to safely traverse while carrying a load.

- Remote access. The laborers would be restricted to moving debris that is already near the staging area and that is located in relatively easy-to-access areas.

- Cost. Due to the extent, volume, and nature of the debris the total duration of the project, and therefore the cost of the project would ultimately be greater under this scenario.

Crane

The use of a crane would be restricted to removing debris that is very close to the mesa top. If the use of a crane were thought to be an effective removal option in a particular situation, the type, size, and lifting capacity of the crane would be evaluated with respect to the type, location, and weight of the debris and the availability of adequate safe lifting sites in which to stage the crane.

Removal by crane would require that the debris first be loaded into cargo nets, fabric waste bags, or some alternative container. Lifting straps could also be used to lift certain types of larger debris. The crane's lifting cable would then be attached to the container or strap and the debris would be lifted to the top of the mesa. However, at some point, as the lateral distance from the crane and the distance down the slope increase, the crane would be unable to continue safely and other removal options would need to be instituted.

Advantages

- Worker health and safety. Using a crane is a standard operation with well-defined capabilities and safety guidelines. Because the hazards are well understood, they can be planned for and mitigated, thereby creating minimal health and safety risks for the workmen.

- Environment. As long as the loads are lifted straight up, disturbance to the environment will be minimal. If loads must be dragged along the ground until they can be lifted vertically, some vegetation may be damaged, although measures could be taken to minimize this damage. However, because of safety considerations, the use of a crane to drag loads across the ground for any appreciable distance would not be permitted.

- Load capacity. The load capacity of a crane would be at least as high or higher than the load capacity for any other option being considered.

Disadvantages

- Cost. Crane rental, depending on size and capacity, can be very expensive. However, under appropriate circumstances and for short periods of time, a crane may be a cost-effective method of debris removal.

- Mobility. A crane would be mobile only in its ability to be moved to almost any location along the rim of the mesa at which it could be safely staged. However, any movement and setup of the crane would require some potentially expensive bulldozer and site preparation work along the edge of the mesa top to provide adequate access roads and setup pads. In spite of its mobility, the use of a crane to recover debris beyond the uppermost portion of the slope would be very limited. The laborers would be restricted to moving debris that is already near the staging area and that is located in relatively easy-to-access areas.

- Remote access. Access would be limited to debris that is very near the top of the mesa.

Cable/Pulley System

A cable/pulley system is considered a viable option for moving large volumes of debris, relatively quickly, from any position on the slope above which the system can be constructed. This system would be mobile, would allow lifting loads of up to 1000 LB, and would have the flexibility to move loads either up- or downslope to a staging area.

The cable/pulley system would have the following design elements: (1) a primary overhead steel cable that would be installed from the bottom of the canyon to the top edge of the mesa, (2) a secondary steel cable that would pull the load either up or down the primary cable, and (3) a winch line that would lift and support the load while it is moved to the staging area. The primary steel cable would most likely consist of approximately 1500 ft of 3/4 in.-diameter wire-wrapped steel cable. This cable would be stretched between a bulldozer at the top of the mesa an anchor at the bottom of the canyon. The secondary steel cable would consist of a similar length of smaller-diameter, wire-wrapped steel cable that would pull the load up or down the primary cable. A battery-operated winch-and-pulley system would lift and support the load while it is moved to the staging area.

Advantages

- Cost. The initial cost to design and construct a cable/pulley system would be relatively high, but once constructed, the cost of maintaining and operating the system would be relatively low. The cost-effectiveness of such a system ultimately would depend on its productivity and on the length of time that the system could be used, thereby decreasing the amount of time that manual or helicopter removal would be required.

- Load capacity. The cable/pulley system would be designed to safely lift and move loads of up to 1000 lb. This lifting capacity would be adequate for most loads the system would be expected to move.

- Mobility. The cable/pulley system would be somewhat mobile since the bulldozer used for the top anchor could be moved along the rim of the mesa. The system's mobility would be most severely limited by the tall ponderosa pines and fir trees that are fairly abundant on the south side of Pueblo Canyon. Considerable cost also would be associated with moving and rerigging the system, thereby making it advantageous to move the system as little as possible.

Disadvantages

- Worker health and safety. Constructing and operating this system would present unique health and safety hazards that must be defined and mitigated. Initial impressions of the health and safety aspects of such a system are that it would potentially be the most hazardous of the removal options.

- Environment. To allow construction or increase mobility of the primary cable, it may be necessary to cut down an occasional pine or fir tree. Movement of the bulldozer and construction of a stationary anchor at the bottom of the canyon also would cause some of disturbance to the environment.

- Remote access. Access would be limited to debris within a given distance on either side of the primary cable. The primary cable would be somewhat moveable, but it would not be cost-effective to move the cable for only a few pieces of debris.

- Mobility. The laborers would be restricted to moving debris that is already near the staging area and that is located in relatively easy-to-access areas.

Skyline Logging System (Yarder)

These systems are very effective in removing material from environmentally sensitive areas with steep and undulating terrain. In general this system requires rigging a cable from a crane or tower positioned on the mesa top to an anchor point near the road at the bottom. Debris will be loaded into a carriage suspended from this stationary cable or main line. The carriage is controlled by a second cable extending from a winch, fixed below the tower, to the carriage. The empty carriage is deployed down the mainline via gravity. Once loaded, the carriage will be retrieved by the winch at the tower. Each carriage is equipped with an independent motor, winch and cable to facilitate retrieval of debris located along the side slopes of the four drainages. The capability to retrieve material that is not directly under the main line is a key element in reducing manual handling of individual debris items, but the greatest benefit of this system may be to worker safety. In the government's evaluation of the option to use a helicopter for debris removal it was noted that manual labor would be required to loosen, lift and carry each item to a collection bin. Details of Skyline Logging equipment and performance are available on-line at www.forestengineer.com and are summarized in Appendix C.

Advantages

- Environment. Removal of debris using skyline logging systems is well suited for the terrain at this site. This system is very effective in environmentally sensitive areas with steep, rugged and undulating terrain such as the south side of Pueblo Canyon. A distinct advantage of the skyline system is it's capability to remove individual or multiple items located laterally, away from the alignment of the mainline cable. Once the cable is threaded through one or more tires, or a hook attached to an object, retrieval will be mechanical.

- Safety. This job is inherently dangerous, but minimizing the number of trips required required by workers to remove the total volume of debris will greatly reduce associated safety risks.

- Cost. Skyline logging is less costly that the other options considered other than manual removal.

Disadvantages

- Safety. The inherent risks associated with skyline logging require completed and strict adherence to an approved health and safety plan.

- Environment. Use of this system will require removal of some trees to prevent heat build up by friction of the cable against standing trees.

Helicopter

For heavy debris, and debris for which no other removal option is available, a helicopter could be used to lift the debris out of the canyon to a staging area. If use of the helicopter is determined to be safe and relatively cost-effective, it also may be used for removing smaller debris. The use of a helicopter is relatively simple in that it does not require a great deal of up-front planning and design. The helicopter company being considered for this project has extensive experience with recovery and rescue jobs. Use of a helicopter primarily will present logistical and health and safety issues that must be addressed.

Debris removal by helicopter would require that the debris first be loaded into cargo nets, fabric waste bags, or some alternative container. Lifting straps could also be used to lift tires and certain types of larger debris. If there are tall trees in the immediate vicinity, the debris may need to be pulled some distance away from the trees in order for the helicopter to safely approach and lower its lifting cable.

Advantages

- Environment. Use of a helicopter would cause relatively little environmental damage compared to the other options.
- Load capacity: The helicopter would be useful for loads of up to 1000 LB, which would equal the design capacity of the cable/pulley system. Only a crane would have a higher lift capacity.
- Mobility. A helicopter essentially could reach any location on the side of the canyon. It would be limited only by the proximity of very tall trees and vertical tuff outcrops.
- Remote access. Since a helicopter could access most locations on the side of the canyon, it would be useful for recovering isolated debris in areas that are too remote to set up the cable/pulley system or to remove manually.

Disadvantages

- Worker health and safety. The use of a helicopter will present some health and safety issues since an accident could be potentially catastrophic. Management at DOE and U.C. do not believe that the overall benefit to the public or the environment warrant the risks to worker safety associated with use of helicopter to remove legacy debris from an ephemeral water course. Other potential issues may involve excessive noise complaints from residents on North Mesa and air traffic control problems with incoming or outgoing air traffic at the airport. Manual labor would be required to loosen, lift and carry each item to a bin or container before the helicopter is deployed. These repeated activities add to over all risks to work force during this job.
- Cost. The hourly rental rate for a helicopter is relatively expensive. Because hourly costs continue to accrue when the helicopter is on-site, the cost-effectiveness of this option depends entirely on how much debris is moved per hour, and how many total hours are needed to complete the work.

Appendix C

Skyline Cable System Specifications

TMY-40 Mobile Yarder Specifications

Operating Weight	34,000 lbs
Tower height	40 ft
Guyline Capacity	Six 2 part ½ in. by 175 ft.
Power Train Engine Transmission Air compressor	 Caterpillar 3116 DITA 175 HP Allison MT 643 4F-1R auto sift 12.5 CFM engine driven
Control Cab	Side entry, air, heater defroster wiper, WCB guarding
Fuel tank	50 U.S. gallons
Carrier Options	Self propelled with highway front mounted cab, 45 MPH

	Main	Haulback	Skyline
Capacity Line Rating	2000 @ ½ in. dia 32,000 lbs.	4300 @ ¾ dia 90,400 lbs.	8000 @ ¾ in. dia 70,800 lbs.
Line Pull Bare Average Full	 30,230 lbs. 23,260 lbs. 19,480 lbs.	 35,290 lbs 21,910 lbs 17,850 lbs	 35,530 lbs. 22,320 lbs. 17,970 lbs.
Line Speed Bare Average Full	 1946 FPM 2130 FMP 2550 FPM	 1410 FPM 2285 FPM 2400 FPM	 1300 FPM 2210 FPM 2740 FPM

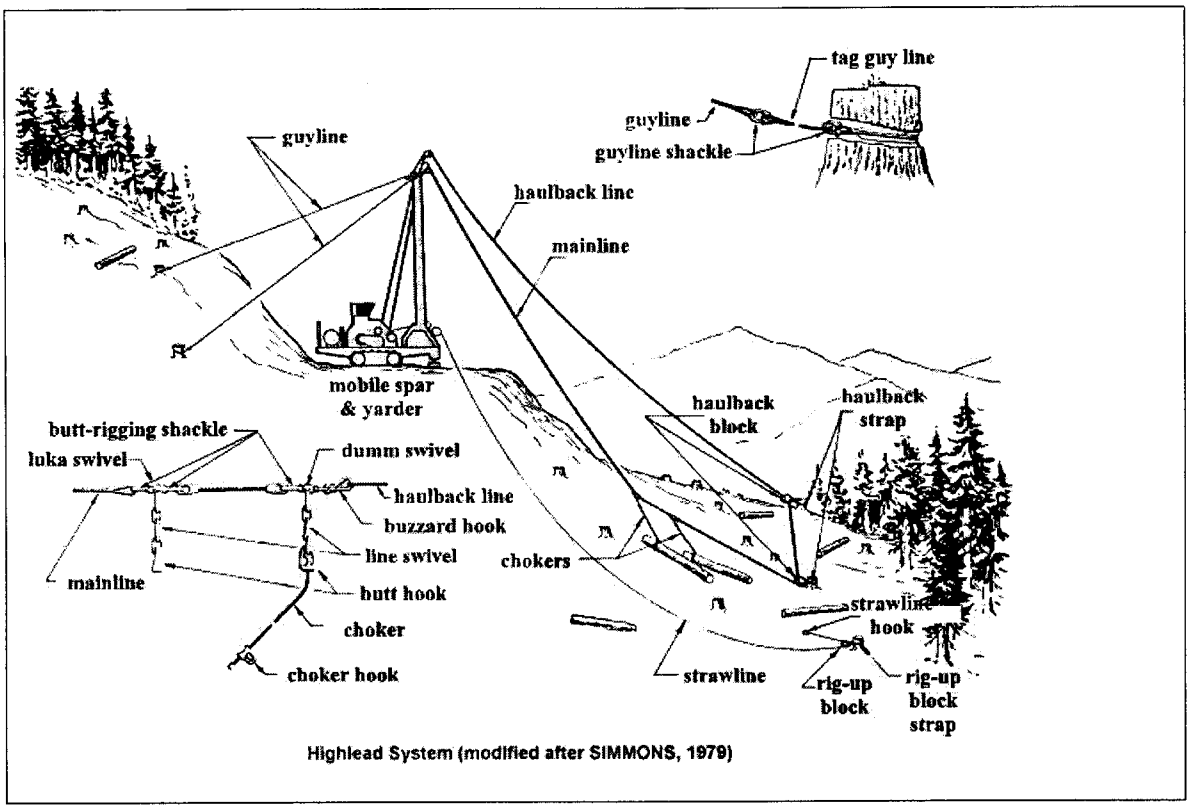

Figure C-1. Skyline Logging (Yarder) Highlead System